What is Claimed is:

1. An apparatus for performing dequantization of an encoded video data stream, comprising:

means for receiving a quantization matrix corresponding to the encoded video data stream;

means for receiving a scale representing a compression ratio of the encoded video data stream;

means for receiving non-zero IDCT coefficient matrix corresponding to a block of the encoded video data;

means for multiplying a diagonal cosine matrix and the standard quantization matrix to create a modified standard quantization matrix; and

means for multiplying the scale, the non-zero IDCT coefficient matrix and the modified standard quantization matrix.

2. An apparatus for performing dequantization of an encoded video data stream, comprising:

means for receiving a modified standard quantization matrix, the modified standard quantization matrix being a product of a standard quantization matrix corresponding to the encoded video data stream and a diagonal cosine matrix;

means for receiving a scale representing a compression ratio of the encoded video data stream;

means for receiving non-zero IDCT coefficient matrix corresponding to a block of the encoded video data; and

means for multiplying the scale, the non-zero IDCT coefficient matrix and the modified standard quantization matrix.

3. A method for performing dequantization of an encoded video data stream, comprising the following steps:

receiving a quantization matrix corresponding to the encoded video data stream;

receiving a scale representing a compression ratio of the encoded video data stream;

receiving a non-zero IDCT coefficient matrix corresponding to a block of the encoded video data;

multiplying a diagonal cosine matrix and the standard quantization matrix to create a modified standard quantization matrix; and

multiplying the scale, the non-zero IDCT coefficient matrix and the modified standard quantization matrix.

4. A method for performing dequantization of an encoded video data stream, comprising:

receiving a modified standard quantization matrix, the modified standard quantization matrix being a product of a standard quantization matrix corresponding to the encoded video data stream and a diagonal cosine matrix;

receiving a scale representing a compression ratio of the encoded video data stream;

receiving a non-zero IDCT coefficient matrix corresponding to a block of the encoded video data; and

multiplying the scale, the non-zero IDCT coefficient matrix and the modified standard quantization matrix.

5. An apparatus for performing IDCT on dequantization video signal data, comprising:

means for performing IDCT row calculations on the dequantization video signal data without multiplying the dequantization video signal data by a diagonal cosine matrix; and

means for performing IDCT column calculations on the dequantization video signal data without multiplying the dequantization video signal data by a diagonal cosine matrix.

6. An apparatus for performing IDCT on dequantization video signal data, comprising:

a first IDCT block for performing IDCT calculations; and

a second IDCT block for performing IDCT calculations.

7. The apparatus according to claim 6, wherein the first and second IDCT block

further include:

adding means for adding two video signal data values;

subtracting means for subtracting a first video signal data value from a second video signal data value;

means for truncating final IDCT signal data, the final IDCT signal data resulting from the adding means and the subtracting means;

means for multiplying butterfly constants with a result of the subtracting means; and

means for shifting a result of the adding means left 8 bits.

8. The apparatus according to claim 7, wherein the adding means further include:

a first multiplexer having a first data input, a second data input, a third data input, a fourth data input, a select line, and an output;

a second multiplexer having a first data input, a second data input, a third data input, a fourth data input, a select line, and an output; and

an adder having a first input operatively coupled to the first multiplexer output, a second input operatively coupled to the second multiplexer output, and an output.

9. The apparatus according to claim 7, wherein the subtracting means further includes:

a third multiplexer having a first data input, a second data input, a third data input, a fourth data input, a select line, and an output;

a fourth multiplexer having a first data input, a second data input, a third data

input, a fourth data input, a select line, and an output; and

a subtractor having a first input operatively coupled to the third multiplexer output, a second input operatively coupled to the fourth multiplexer output, and an output.

10. A method for performing IDCT calculations on dequantization video signal data, the method comprising the following steps:

performing IDCT row calculations on the dequantization video signal data; and

performing IDCT column calculations on the dequantization video signal data, wherein the steps of performing IDCT row and column calculations include a plurality of stages of calculations.

11. The method according to claim 10, wherein a first one of the plurality of stages includes the following sub-steps:

receiving a third dequantization output value in the sequence of dequantization output values;

receiving a fifth dequantization output value in the sequence of dequantization output values;

adding the third dequantization output value and the fifth dequantization output value to produce a third sum;

subtracting the fifth dequantization output value from the third dequantization output value to produce a third difference;

multiplying the third difference by a third butterfly constant to produce a third product; and

subtracting the third sum from the third product to produce a third value.

12. The method according to claim 11, wherein a second one of the plurality of stages includes the following sub-steps:

receiving a first dequantization output value in a sequence of dequantization output values;

receiving a seventh dequantization output value in the sequence of dequantization output values;

adding the first dequantization output value and the seventh dequantization output value to produce a first sum;

subtracting the seventh dequantization output value from the first dequantization output value to produce a first difference;

multiplying the first difference by a first butterfly constant to produce a first product; and

subtracting the first sum from the first product to produce a first value.

13. The method according to claim 12, wherein a third one of the plurality of stages includes the following sub-steps:

receiving a second dequantization output value in the sequence of

dequantization output values;

receiving a sixth dequantization output value in the sequence of dequantization output values;

adding the second dequantization output value and the sixth dequantization output value to produce a second sum;

subtracting the sixth dequantization output value from the second dequantization output value to produce a second difference;

multiplying the second difference by a second butterfly constant to produce a second product;

subtracting the second sum from the second product to produce a second value;

adding the first sum and the third sum to produce a third intermediate value; and

subtracting the third sum from the first sum to produce a fourth difference.

14. The method according to claim 13, wherein a fourth one of the plurality of stages includes the following sub-steps:

receiving a zeroth dequantization output value in the sequence of dequantization output values;

receiving a fourth dequantization output value in the sequence of dequantization output values;

adding the zeroth dequantization output value and the fourth dequantization output value to produce a fifth sum;

subtracting the fourth dequantization output value from the zeroth dequantization output value to produce a fourth sum;

adding the first value and the third value to produce a seventh intermediate value;

subtracting the third value from the first value to produce a fifth difference;

multiplying the fifth difference and a second butterfly constant to produce an eighth intermediate value; and

subtracting the third intermediate value from the eighth intermediate value to produce a second temporary value.

15. The method according to claim 14, wherein a fifth one of the plurality of stages includes the following sub-steps:

adding the fifth sum and the second sum to produce a first intermediate value;

subtracting the second sum from the fifth sum to produce a second intermediate value;

adding the fourth sum and the second value to produce a fifth intermediate value;

subtracting the second value from the fourth sum to produce a sixth intermediate value;

multiplying the fourth difference and the second butterfly constant to produce a fourth intermediate value; and

subtracting the seventh intermediate value from the fourth intermediate value to produce a first temporary value.

16. The method according to claim 15, wherein a sixth one of the plurality of stages

includes the following sub-steps:

adding the first intermediate value and the third intermediate value to produce a zeroth output value;

adding the second intermediate value and the second temporary value to produce a third output value;

subtracting the third intermediate value from the first intermediate value to produce a seventh output value; and

subtracting the second temporary value from the second intermediate value to produce a fourth output value.

17. The method according to claim 16, wherein a seventh one of the plurality of stages includes the following sub-steps:

adding the sixth intermediate value and the first temporary value to produce a second output value;

adding the fifth intermediate value and the seventh intermediate value to produce a first output value;

subtracting the first temporary value from the sixth intermediate value to produce a fifth output value; and

subtracting the seventh intermediate value from the fifth intermediate value to produce a sixth output value.

18. In a video decoder, an apparatus for performing dequantization and IDCT calculations in parallel, comprising:

a dequantization block capable of performing dequantization calculations on a block of encoded video signal data using a modified standard quantization matrix, the modified standard quantization matrix being a product of a standard quantization matrix and a diagonal cosine matrix, the dequantization block producing dequantization output data; and

an IDCT block capable of performing IDCT calculations on the dequantization output data.

19. The apparatus according to claim 18, further including:

a command queue block having an input operatively coupled to an encoded input data stream, the command queue block outputting the block of encoded video signal data corresponding to one block of input data for use by the dequantization block.

20. The apparatus according to claim 18, wherein the block of encoded video signal data includes:

a modified standard quantization matrix;

data comprising a plurality of IDCT coefficients corresponding to a block of encoded video signal data;

an index for determining a location of the data within the block; and

a scale indicating an MPEG-II compression ratio for the block of encoded video signal data.

21. The apparatus according to claim 20, wherein the index transfers only non-zero data.

22. The decoder according to claim 18, wherein the dequantization block and the IDCT block process each block of encoded video signal data in parallel.

23. In a video decoder, a method for performing dequantization and IDCT calculations in parallel, comprising:

performing dequantization calculations on a block of encoded video signal data using a modified standard quantization matrix, the modified standard quantization matrix being a product of a standard quantization matrix and a diagonal cosine matrix, the dequantization block producing dequantization output data; and

performing IDCT butterfly calculations on the dequantization output data.